

## CLAIMS

What is claimed is:

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1 85/1.

1. A medical information transmitter comprising:

2 A) a data interface for acquiring a medical data file having an application  
3 entity title;

4 B) an assembly unit configured to assemble the medical data to form data  
5 packets;

6 C) a remapping unit configured to attach an address to the packets for  
7 identifying a disassembly structure;

8 D) a processing unit configured to encrypt the packets across protocol layers  
9 for decryption by the disassembly structure; and

10 E) a network interface configured to transmit the packets into a public  
11 network for receipt at the disassembly structure.

1 2. The information transmitter of claim 1, wherein the processing unit is further  
2 configured to authenticate the packets across protocol layers.

1 3. The information transmitter of claim 2, wherein the processing unit is further  
2 configured to provide key management to the packets across protocol layers.

1 4. The information transmitter of claim 1, wherein the processing unit is configured to  
2 encrypt the packets in a manner compliant with IP Security Standards.

1 5. The information transmitter of claim 1, wherein the processing unit is configured to  
2 authenticate and provide key management in a manner compliant with IP Security  
3 Standards.

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1 6. The information transmitter of claim 4, wherein the processing unit is further  
2 configured to encapsulate each of the packets into outer packets.

1 7. The information transmitter of claim 1, further including a firewall.

1 8. The information transmitter of claim 7, wherein the firewall includes a first network port  
2 at the data interface and a second network port at the network interface.

1 9. The information transmitter of claim 1, wherein the remapping unit attaches the  
2 address by:

3 (i) examining the packet content;

4 (ii) determining a receiving station based on the content;

5 (iii) determining the address that identifies the disassembly structure  
6 associated with the receiving station; and

7 (iv) attaching the address to the packets.

1 10. The information transmitter of claim 1, wherein the attached address is an alias AE  
2 title and the remapping unit is configured to attach the alias AE title by:

3 (i) accepting an AE title that identifies a receiving station;

4 (ii) cross-referencing from a relational database, the AE title with the  
5 alias AE title that identifies a disassembly structure associated with  
6 the receiving station; and

7 (iii) attaching the alias AE title to the packets.

1 11. The information transmitter of claim 1, wherein the attached address is a routable IP  
2 address and the remapping unit is configured as an NAT to attach the routable IP  
3 address by:

4 (i) accepting a private IP address that identifies a receiving station;

5 (ii) cross-referencing from a relational database, the private IP address  
6 with the routable IP address that identifies a disassembly structure  
7 associated with the receiving station; and

8 (iii) attaching the routable IP address to the packets.

1 12. The information transmitter of claim 10, further comprising an updating unit for  
2 adding the alias AE titles to the relational database.

1 13. The information transmitter of claim 12, wherein the updating unit adds the alias  
2 AE titles to the relational database by synchronous asymmetric replication.

1 14. The information transmitter of claim 1, wherein the public network comprises  
2 conventional telephone lines, ADSL, ISDN, fiber optic cables, ATM network links,  
3 DSL connections, satellite links, or a combination thereof.

1 15. The information transmitter of claim 1, wherein the assembly unit is further  
2 configured to assemble between 0.1 megabyte and 5.0 megabyte portions of medical  
3 data into each of the packets.

1 16. The information transmitter of claim 1, wherein the assembly unit is further  
2 configured to assemble between 50 bytes and 500 bytes portions of medical data  
3 into each of the packets.

1 17. The information transmitter of claim 1, further comprising an acknowledgement  
2 unit configured to receive confirmation of completed packet transfers from the  
3 disassembly structure within a threshold time.

1 18. The information transmitter of claim 16, wherein the acknowledgment unit is  
2 further configured to cause the information transmitter to resend only those portions  
3 of the data file to which no acknowledgments are received within the threshold  
4 time.

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1 19. The information transmitter of claim 1, wherein the medical data file comprises  
2 text, image, overlay, 3-D volume, waveform, curve, video, and/or sound data, or  
3 any combination thereof.

1 20. The information transmitter of claim 19, wherein the medical data file is of a form  
2 conformant with the DICOM Standards and/or HL7 Standards.

1 21. A medical virtual private network system comprising:

2 A) a medical modality configured to generate medical data and  
3 comprising a mapping unit for attaching an application entity title to the medical  
4 data for identifying a medical information transmitter;

5 B) the medical information transmitter comprising:

6 (i) a data interface communicatively coupled to the medical  
7 modality for acquiring the medical data from the medical  
8 modality;

9 (ii) an assembly unit configured to assemble the medical data to  
10 form data packets;

- 11 (iii) a remapping unit configured to attach an address to the  
12 packets for identifying a disassembly structure;
- 13 (iv) a processing unit configured to encrypt the packets for  
14 decryption by the disassembly structure; and
- 15 (v) a network interface configured to send the packets into a  
16 public network for receipt at the disassembly structure.

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 22. The network system of claim 21, wherein the medical modality comprises radiology  
2 equipment.

1 23. The network system of claim 21, further comprising a plurality of medical  
2 modalities.

1 24. The network system of claim 21, further comprising a disassembly structure  
2 configured to decrypt the packets.

1 25. The network system of claim 24, further comprising a plurality of disassembly  
2 structures.

1 26. The network system of claim 24, wherein the disassembly structure is a second  
2 medical information transmitter.

1 27. The network system of claim 24, further comprising a receiving station.

1 28. The network system of claim 24, further comprising a plurality of receiving stations.

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1 29. A computer readable medium having stored therein a plurality of sequences of  
2 instructions, which, when executed by a processor in a transmitter, cause the  
3 processor to:

4 A) assemble medical data into packets;

5 B) attach an address to the packets for identifying a disassembly structure;

6 C) encrypt the packets across protocol layers for decryption by the disassembly  
7 structure; and

8 D) send the packets into a public network for receipt at the disassembly  
9 structure.

1 30. The computer readable medium of claim 29, further including additional sequences  
2 of instructions, which, when executed by the processor, cause the processor to  
3 authenticate the packets across protocol layers.

1 31. The computer readable medium of claim 30, further including additional sequences  
2 of instructions, which, when executed by the processor, cause the processor to  
3 provide key management to the packets across protocol layers.

1 32. The computer readable medium of claim 29, wherein the encryption is compliant  
2 with IP Security Standards.

1 33. The computer readable medium of claim 31, wherein the authentication and key  
2 management are compliant with IP Security Standards.

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1 34. The computer readable medium of claim 29, wherein the address is an alias AE title  
2 and the attaching of the address is by:

- 3 (i) accepting an AE title that identifies a receiving station;  
4 (ii) cross-referencing from a relational database, the AE title with the  
5 alias AE title that identifies a disassembly structure associated with  
6 the receiving station; and  
7 (iii) attaching the alias AE title to the packets.

1 35. The computer readable medium of claim 29, wherein the address is a routable IP  
2 address and the attaching of the address is by NAT including the steps of:

- 3 (i) accepting a private IP address that identifies a receiving station;  
4 (ii) cross-referencing from a relational database, the private IP address  
5 with the routable IP address that identifies a disassembly structure  
6 associated with the receiving station; and  
7 (iii) attaching the routable IP address to the packets.



1 36. Computer readable instructions, which when executed cause a processor to:

2 A) assemble medical data into packets;

3 B) attach an address to the packets for identifying a disassembly

4 structure;

5 C) encrypt the packets across protocol layers for decryption by the

6 disassembly structure; and

7 D) send the packets into a public network for receipt at the disassembly

8 structure.

1 37. The computer readable instructions of claim 36, wherein the address is an alias AE

2 title and the attaching of the address is by:

3 (i) accepting an AE title that identifies a receiving station;

4 (ii) cross-referencing from a relational database, the AE title with the

5 alias AE title that identifies a disassembly structure associated with

6 the receiving station; and

7 (iii) attaching the alias AE title to the packets.

1 38. The computer readable instructions of claim 36, wherein the address is a routable IP

2 address and the attaching of the address is by NAT including the steps of:

- 3 (i) accepting a private IP address that identifies a receiving station;
- 4 (ii) cross-referencing from a relational database, the private IP address
- 5 with the routable IP address that identifies a disassembly structure
- 6 associated with the receiving station; and
- 7 (iii) attaching the routable IP address to the packets.

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1 39. A method, comprising the steps of:

- 2 A) assembling medical data into packets;
- 3 B) attaching an address to the packets for identifying a disassembly
- 4 structure;
- 5 C) encrypting the packets across protocol layers for decryption by the
- 6 disassembly structure; and
- 7 D) sending the packets into a public network for receipt at the
- 8 disassembly structure.

1 40. The method of claim 39, further including the step of compressing the packets using

2 at least one of a wavelet, a motion wavelet, an MPEG, a motion JPEG, a Lempel

3 Ziv or fractal compression scheme.

41 Rule 1126  
41 1 42. The method of claim 39, wherein the step of encrypting is compliant with IPsec

2 Standards.

1 <sup>42</sup>45. The method of claim <sup>41</sup>42, further including the step of encapsulating the packet into  
2 an outer packet.

1 <sup>43</sup>44. The method of claim <sup>42</sup>43, wherein the outer packet includes an encryption field.

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1 <sup>44</sup>45. The method of claim 39, wherein the address is an alias AE title and the attaching of  
2 the address includes the steps of:

- 3 (i) accepting an AE title that identifies a receiving station;
- 4 (ii) cross-referencing from a relational database, the AE title with the
- 5 alias AE title that identifies a disassembly structure associated with
- 6 the receiving station; and
- 7 (iii) attaching the alias AE title to the packets.

1 <sup>45</sup>46. The method of claim 39, wherein the address is a routable IP address and the  
2 attaching of the address is by NAT and includes the steps of:

- 3 (i) accepting a private IP address that identifies a receiving station;
- 4 (ii) cross-referencing from a relational database, the private IP address
- 5 with the routable IP address that identifies a disassembly structure
- 6 associated with the receiving station; and
- 7 (iii) attaching the routable IP address to the packets.

1 4647. The method of claim 39, further including the step of converting the medical data to  
2 be compliant with the DICOM Standards after the packets are received at the  
3 disassembly structure.

1 4748. A method of transmitting medical information comprising:  
2 A) assembling a medical data file into packets;  
3 B) sending the packets into a public network for receipt at a disassembly  
4 structure;  
5 C) considering whether an acknowledgement of completed packet transfer  
6 is received from the disassembly structure within a threshold time; and  
7 D) resending into the public network only that portion of the medical data  
8 file to which no acknowledgment is received within the threshold time.

1 4849. The method of claim 47, wherein between 0.1 megabytes and 5.0 megabytes of  
2 medical data is assembled into each packet.

1 4950. A method acquiring medical information comprising:  
2 A) receiving packets comprising medical information sent by sent by a  
3 transmitter across a public network;  
4 B) sending acknowledgments of successful transfer to the transmitter;  
5 C) decrypting the packet to reveal an address of a receiving station;

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D) transferring the medical information to the receiving station.

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The method of claim 50, wherein the revealed address is an AE title of a receiving station.

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The method of claim 50, further including the step of converting the medical information to be compliant with the DICOM Standards prior to transferring the information to the receiving station.

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